

## Metalliferous, hydrogen-storing material and process for its production

### Patent claims

1. Metalliferous, hydrogen-storing material which contains a catalysing agent for its hydrogenation or dehydrogenation, characterised in that the catalysing agent is a metal carbonate.
2. Metalliferous material according to claim 1, characterised in that the metal carbonate consists of mixtures of metal carbonates.
3. Metalliferous material according to claim 1, characterised in that the metal carbonate consists of mixed carbonates of metals.
4. Metalliferous material according to one or several of claims 1 to 3, characterised in that the metal carbonate is a carbonate of an elemental metal.
5. Metalliferous material according to claim 4, characterised in that the metal carbonate is the carbonate of the metals Li, Be, B, Na, Mg, Al, Si, K, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, Rb, Sr, Y, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Cs, Ba, La, Hf, Ta, W, Re, Os, Ir, Pt, Au, Hg, Tl, Pb, Fr, Ra, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No, Lw.
6. Metalliferous material according to one or several of claims 1 to 4, characterised in that the metal carbonate is the carbonate of the metals or metal mixtures of the rare earths.
7. Metalliferous material according to one or several of claims 1 to 6, characterised in that the metal carbonate is formed by different metal carbonates of the same metal.
8. Metalliferous material according to one or several of claims 1 to 7, characterised that the carbonate is formed in-situ from the storage material by the addition of an organic solvent.

9. Metalliferous material according to one or several of claims 1 to 8, characterised in that this exhibits a nanocrystalline structure.
10. Metalliferous material according to one or several of claims 1 to 9, characterised in that the catalysing agent exhibits a nanocrystalline structure.
11. Metalliferous material according to one or several of claims 1 to 10, characterised in that the carbonate content is between 0.005 mole% and 20 mole%.
12. Process for the production of a metalliferous, hydrogen-storing material according to one or several of claims 1 to 11, characterised in that the metalliferous material and/or the catalysing agent is or are subjected to a mechanical milling process.
13. Process according to claim 10, characterised in that the milling process is carried out for periods of different lengths depending on the metalliferous material and/or catalysing agent.
14. Process according to one or both of claims 12 or 13, characterised in that the metalliferous material is first subjected to the milling process and subsequently, following the addition of the catalysing agent to it, the milling process is continued with respect to the metalliferous material and the catalysing agent.
15. Process according to one or both of claims 12 or 13, characterised in that catalysing agent is first subjected to the milling process and subsequently, following the addition of the metalliferous material to it, the milling process is continued with respect to the catalysing agent and the metalliferous material.
16. Process according to one or both of claims 12 or 13, characterised in that the metalliferous material and the catalysing agent are subjected separately to a milling process respectively and subsequently mixed.
17. Process according to one or both of claims 12 or 13, characterised in that the metalliferous material and the catalysing agent are ground jointly.

18. Process according to one or several of claims 12 to 17, characterised in that the duration of the milling process is in the range of from 1 min to 200 h.
19. Process according to claim 18, characterised in that the duration of the milling process is in the range of from 20 h to 100 h.
20. Process according to one or several of claims 12 to 19, characterised in that the milling process is carried out under an inert gas atmosphere.
21. Process according to claim 20, characterised in that the inert gas is argon.
22. Process according to one or several of claims 12 to 20, characterised in that the milling process is carried out with an addition of an organic solvent.
23. Process according to one or several claims 12 to 19, 22, characterised in that the milling process is carried out under a CO and/or CO<sub>2</sub>-containing atmosphere.